

Injection Wells

A Class V Injection Well permit may be required for various types of projects. For example such a permit may be needed if a project is located within the karst region of the state or a sole source aquifer area, or where INDOT proposes to discharge storm water runoff to a drywell. Injection wells are **"any dug hole or well that is deeper than its largest surface dimension, where the principal function of the hole is emplacement of fluids."**

Laws regarding injection wells are in the Underground Injection Control Program, part of the Safe Drinking Water Act. The Underground Injection Control Program was designed to prevent contamination of Underground Sources of Drinking Water (USDW) resulting from injection wells. A USDW is an **"aquifer or its portion which supplies any public water system or contains a sufficient quantity of groundwater to supply a public water system and currently supplies drinking water for human consumption or contains less than 10,000 mg/l total dissolved solids and is not an exempted aquifer."** Waters of lesser salinity and mineral content are usually located nearer the earth's surface. This deeper groundwater, into which liquid waste disposal takes place, is water of limited quality with high dissolved mineral concentrations, and are not potential sources of drinking water.

A Class V Injection Well is a catch-all injection well classification. Injection wells not covered under other injection well classifications are Class V Injection Wells. Class V Injection Wells generally pump non-hazardous fluids underground. They can include multiple dwelling septic systems, cooling water return wells, drainage wells and drywells. They range in complexity from simple cesspools, barely deeper than they are wide to sophisticated geothermal reinjection wells that may be thousands of feet deep. Most Class V Injection Wells are either drainage wells or sewage type wells and are in or above the USDW. The potential for contaminating groundwater varies and depends on the following factors:

1. where injection occurs relative to the aquifer;
2. well construction, design, and operation;
3. quality or effluent concentrations of injectate; and
4. volumes of wastes injected.

Wells injecting below the lowermost USDW have the lowest potential for contaminating groundwater. Class V injection directly into USDW is potentially more harmful to water quality than discharges above the water table, due to the lack of attenuation, adsorption and degradation that takes place in the unsaturated zone.

Injection Wells

If a Class V injection well is proposed for an INDOT project, a Class V Well Inventory Form (**attached**) must be completed and submitted to U.S. EPA Region 5. This includes "improved sinkholes" that receive storm water runoff from construction sites or facilities located in karst areas. Each site requires only one Class V Well Inventory for multiple wells with the same construction or purpose. Obtain additional guidance concerning injection wells and groundwater protection from the U.S. EPA Region 5, or from the IDEM Groundwater Section.

40 CFR 146.5 CLASSIFICATION OF INJECTION WELLS.

INJECTION WELLS ARE CLASSIFIED AS FOLLOWS:

- (a) Class I.
 - (1) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within one quarter (+) mile of the well bore, an underground source of drinking water.
 - (2) Other industrial and municipal disposal wells which inject fluids beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.
- (b) Class II. Wells which inject fluids:
 - (1) Which are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection.
 - (2) For enhanced recovery of oil or natural gas; and 40 CFR 146.5(b)(3)
 - (3) For storage of hydrocarbons which are liquid at standard temperature and pressure.
- (c) Class III. Wells which inject for extraction of minerals including:
 - (1) Mining of sulfur by the Frasch process;
 - (2) In situ production of uranium or other metals. This category includes only in-situ production from ore bodies which have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class V.
 - (3) Solution mining of salts or potash.
- (d) Class IV.
 - (1) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste into a formation which within one quarter (+) mile of the well contains an underground source of drinking water.
 - (2) Wells used by generators of hazardous waste or of radioactive waste, by owners or operators of hazardous waste management facilities, or by owners or operators of radioactive waste disposal sites to dispose of hazardous waste or radioactive waste above a formation which within one quarter (+) mile of the well contains an underground source of drinking water.
 - (3) Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to dispose of hazardous waste, which cannot be classified under 146.05(a)(1) or 146.05(d)(1) and (2) (e.g., wells used to dispose of hazardous wastes into or above a formation which contains an aquifer which has been exempted pursuant to 146.04).
- (e) Class V. Injection wells not included in Class I, II, III, or IV. Class V wells include:

- (1) Air conditioning return flow wells used to return to the supply aquifer the water used for heating or cooling in a heat pump;
- (2) Cesspools including multiple dwelling, community or regional cesspools, or other devices that receive wastes which have an open bottom and sometimes have perforated sides. The UIC requirements do not apply to single family residential cesspools nor to non-residential cesspools which receive solely sanitary wastes and have the capacity to serve fewer than 20 persons a day.
- (3) Cooling water return flow wells used to inject water previously used for cooling;
- (4) Drainage wells used to drain surface fluid, primarily storm runoff, into a subsurface formation;
- (5) Dry wells used for the injection of wastes into a subsurface formation;
- (6) Recharge wells used to replenish the water in an aquifer;
- (7) Salt water intrusion barrier wells used to inject water into a fresh water aquifer to prevent the intrusion of salt water into the fresh water;
- (8) Sand backfill and other backfill wells used to inject a mixture of water and sand, mill tailings or other solids into mined out portions of subsurface mines whether what is injected is a radioactive waste or not.
- (9) Septic system wells used to inject the waste or effluent from a multiple dwelling, business establishment, community or regional business establishment septic tank. The UIC requirements do not apply to single family residential septic system wells, or to non-residential septic system wells which are used solely for the disposal of sanitary waste and have the capacity to serve fewer than 20 persons a day.
- (10) Subsidence control wells (not used for the purpose of oil or natural gas production) used to inject fluids into a non-oil or gas producing zone to reduce or eliminate subsidence associated with the overdraft of fresh water;
- (11) Radioactive waste disposal wells other than Class IV;
- (12) Injection wells associated with the recovery of geothermal energy for heating, aquaculture and production of electric power.
- (13) Wells used for solution mining of conventional mines such as stopes leaching;)
- (14) Wells used to inject spent brine into the same formation from which it was withdrawn after extraction of halogens or their salts;
- (15) Injection wells used in experimental technologies.
- (16) Injection wells used for in situ recovery of lignite, coal, tar sands, and oil shale.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
UNDERGROUND DISCHARGE SYSTEM (CLASS V) INVENTORY SHEET
INSTRUCTIONS

Complete one inventory sheet for each different type of underground discharge system (i.e., groundwater remediation well, industrial disposal into drain field, storm water drainage well, septic system receiving service bay drain and shop sink wastewater, etc.), at each facility. For example, several storm water drainage wells of similar construction should go on one inventory sheet. A facility's paint shop sink and floor drain and the vehicle maintenance garage drains that are all connected to a flammable waste trap leading into a single septic tank and drain field can go on one inventory sheet.

If the only underground discharge at your facility is a septic system and the only connection and source of fluids or wastewater that can enter the system is from the employee or visitor washroom(s) that is designed to serve less than 20 persons per day, you do not need to complete this inventory sheet.

The numbers below correspond to the numbers on the inventory sheet.

1. Supply the name and street address of the facility where the underground discharge system(s) is located. Please include the City/Town, State and Zip Code. If there is no street address for the discharge system(s), provide a description and locate the system(s) on a map. If available, for the "Location" provide the Township/Range/Section and Quarter-quarter Section (legal description) and the Latitude/Longitude.
2. Provide the name and mailing address of the owner of the facility or if the facility is operated by lease, the operator of the facility. Include the name and phone number of a person to contact if there are any questions regarding the information provided.
3. Indicate the number of each underground discharge system at this location by placing a number in each appropriate system type field. If the type of system is "Other", please describe in #4.
4. Describe the source of the fluids discharged (into the system) or, if appropriate, the purpose of the system and a description of the injection or disposal method. For example, daily shop floor washdown into floor drain, storm water drainage and spills from loading dock area, boiler blowdown, industrial process wastewater, etc. If the system is a well(s) intended for aquifer remediation, attach a description of the nature and cause of the contamination, the levels to which the water is to be treated, and the treatment methods.
5. List or describe the types of fluids that enter the system. If available, attach a copy of the chemical analysis results and/or the Material Safety Data Sheets for the fluids that enter the discharge system.
6. Describe any treatment that fluids undergo before underground discharge.
7. Estimate the average and maximum expected daily flow into the system. If fluids enter the system irregularly or infrequently, such as from a rare process, an occasional spill, seasonally or from monthly or annual maintenance, estimate the volume in more appropriate values (i.e., ounces per year, liters per month, gallons per week during winter only, etc.).

8. Provide a sketch of the well construction including depth and drainage, disposal or injection zone. Describe the construction of each different type of system, and if applicable, indicate each fluid source connection (i.e., shop sink, floor drain, process tank discharge, etc.) and any pre-treatment, etc.

If you have any questions about how to complete this inventory sheet, please contact the USEPA, Underground Injection Control Branch, Direct Implementation Section at (312) 353-4150.

When complete, send to: U.S. Environmental Protection Agency
Underground Injection Control Branch
ATTN: Lisa Perenchio WU-16J
77 W. Jackson Blvd.
Chicago, Illinois 60604-3590

UNDERGROUND DISCHARGE SYSTEM (CLASS V) INVENTORY SHEET

1. Name of facility: _____
Address of facility: _____
City, State, Zip: _____

County: _____
Location: _____

2. Name of Owner/Operator: _____

Address of Owner/Operator: _____

Contact Person: _____ Phone number: _____

3. Type & number of system(s): _____ Drywell _____ Septic system _____ Other _____

4. Source of discharge:

5. Fluids discharged:

6. Treatment before discharge:

7. Average flow: _____ Maximum flow: _____

Discharge approved by State? _____ County? _____ Others: _____

Is this underground discharge system existing? _____ Proposed? _____

Under construction? _____ Does site have access to sewer hook-up? _____

8. Attach a sketch or map of site including the underground discharge system.

Submitted by: _____ Date _____

Title:

Affiliation:

United States Environmental Protection Agency Underground Injection Control Permit Application <i>(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)</i>		I. EPA ID Number	
			T/A C
Read Attached Instructions Before Starting For Official Use Only			
Application approved mo day year		Date received mo day year	
Permit Number		Well ID	
FINDS Number			
II. Owner Name and Address		III. Operator Name and Address	
Owner Name		Operator Name	
Street Address		Street Address	
Phone Number		Phone Number	
City		City	
State		State	
ZIP CODE		ZIP CODE	
IV. Commercial Facility		V. Ownership	
<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Private <input type="checkbox"/> Federal <input type="checkbox"/> Other	
VI. Legal Contact		VII. SIC Codes	
<input type="checkbox"/> Owner <input type="checkbox"/> Operator			
VIII. Well Status (Mark "x")			
<input type="checkbox"/> A. Operating Date Started mo day year		<input type="checkbox"/> B. Modification/Conversion <input type="checkbox"/> C. Proposed	
IX. Type of Permit Requested (Mark "x" and specify if required)			
<input type="checkbox"/> A. Individual <input type="checkbox"/> B. Area		Number of Existing Wells Number of Proposed Wells Name(s) of field(s) or project(s)	
X. Class and Type of Well (see reverse)			
A. Class(es) (enter codes(s))		B. Type(s) (enter codes(s))	
C. If class is "other" or type is code "x," explain		D. Number of wells per type (if area permit)	
XI. Location of Well(s) or Approximate Center of Field or Project			
Latitude		Longitude	
Deg Min Sec		Deg Min Sec	
Township and Range		Feet From Line	
Sec Twp Range 1/4 Sec		Feet From Line	
XII. Indian Lands (Mark "x")			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
XIII. Attachments			
(Complete the following questions on a separate sheet(s) and number accordingly; see instructions) For Classes I, II, III, (and other classes) complete and submit on a separate sheet(s) Attachments A--U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.			
XIV. Certification			
I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)			
A. Name and Title (Type or Print)		B. Phone No. (Area Code and No.)	
C. Signature		D. Date Signed	

Well Class and Type Codes

Class I	Wells used to inject waste below the deepest underground source of drinking water.
Type “I”	Nonhazardous industrial disposal well
“M”	Nonhazardous municipal disposal well
“W”	Hazardous waste disposal well injecting below USDWs
“X”	Other class I wells (not included in Type “I”, “M”, or “W”)
Class II	Oil and gas production and storage related injection wells.
Type “D”	Produced fluid disposal well
“R”	Enhanced recovery well
“H”	Hydrocarbon storage well (excluding natural gas)
“X”	Other Class II wells (not included in Type “D”, “R”, or “H”)
Class III	Special process injection wells.
Type “G”	Solution mining well
“S”	Sulfur mining well by Frasch process
“U”	Uranium mining well (excluding solution mining of conventional mines)
“X”	Other Class III wells (not included in Type “G”, “S”, or “U”)
Other Classes	Wells not included in classes above.
	Class V wells which may be permitted under §144.12
	Wells not currently classified as Class I, II, III, or V.

Attachments to Permit Application

Class	Attachments
I. new well	A, B, C, D, F, H -- S, U
existing	A, B, C, D, F, H -- U
II. new well	A, B, C, E, G, H, M, Q, R; optional -- I, J, K, O, P, U
existing	A, E, G, H, M, Q, R -- U; optional -- J, K, O, P, Q
III. new well	A, B, C, D, F, H, I, J, K, M -- S, U
existing	A, B, C, D, F, H, J, K, M -- U
Other Classes	To be specified by the permitting authority

INSTRUCTIONS -- Underground Injection Control (UIC) Permit Application

This form must be completed by all owners or operators of Class I, II, and III injection wells and others who may be directed to apply for a UIC permit by the Director.

I. EPA I.D. NUMBER -- Fill in your EPA Identification Number. If you do not have a number, leave blank.

II. FACILITY NAME AND ADDRESS -- Name of well, well field or company and address.

III. OPERATOR NAME AND ADDRESS -- Name and address of operator of well or well field.

IV. COMMERCIAL FACILITY -- Mark the appropriate box to indicate the type of facility.

V. OWNERSHIP -- Mark the appropriate box to indicate the type of ownership.

VI. LEGAL CONTACT -- Mark the appropriate box.

VII. SIC CODES -- List at least one and no more than four Standard Industrial Classification (SIC) Codes that best describe the nature of the business in order of priority.

VIII. WELL STATUS -- Mark Box A if the well(s) were operating as injection wells on the effective date of the UIC Program for the State. Mark Box B if the well(s) existed on the effective date of the UIC Program for the State but were not utilized for injection. Box C should be marked if the application is for an underground injection project not constructed or not completed by the effective date of the UIC Program for the State.

IX. TYPE OF PERMIT -- Mark "Individual" or "Area" to indicate the type of permit desired. Note that area permits are at the discretion of the Director and that wells covered by an area permit must be at one site, under the control of one person and do not inject hazardous waste. If an area permit is requested the number of wells to be included in the permit must be specified and the wells described and identified by location. If the area has a commonly used name, such as the "Jay Field," submit the name in the space provided. In the case of a project or field which crosses State lines, it may be possible to consider an area permit if EPA has jurisdiction in both States. Each such case will be considered individually, if the owner/operator elects to seek an area permit.

X. CLASS AND TYPE OF WELL -- Enter in these two positions the Class and type of injection well for which a permit is requested. Use the most pertinent code selected from the list on the reverse side of the application. When selecting type X please explain in the space provided.

XI. LOCATION OF WELL -- Enter the latitude and longitude of the existing or proposed well expressed in degrees, minutes, and seconds or the location by township, and range, and section, as required by 40 CFR 146. If an area permit is being requested, give the latitude and longitude of the approximate center of the area.

XII. INDIAN LANDS -- Place an "X" in the box if any part of the facility is located on Indian lands.

XIII. ATTACHMENTS -- Note that information requirements vary depending on the injection well class and status. Attachments for Class I, II, and III are described on pages 4 and 5 of this document and listed by Class on page 2. Place EPA ID number in the upper right hand corner of each page.

XIV. CERTIFICATION -- All permit applications (except Class II) must be signed by a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, and by a principal executive or ranking elected official for a public agency. For Class II, the person described above should sign, or a representative duly authorized in writing.

INSTRUCTIONS -- Attachments

Attachments to be submitted with permit application for Class I, II, III and other wells.

A. AREA OF REVIEW METHODS -- Give the methods and, if appropriate, the calculations used to determine the size of the area of review (fixed radius or equation). The area of review shall be a fixed radius of 1/4 mile from the well bore unless the use of an equation is approved in advance by the Director.

B. MAPS OF WELLS/AREA AND AREA OF REVIEW -- Submit a topographic map, extending one mile beyond the property boundaries, showing the injection well(s) or project area for which a permit is sought and the applicable area of review. The map must show all intake and discharge structures and all hazardous waste, treatment, storage, or disposal facilities. If the application is for an area permit, the map should show the distribution manifold (if applicable) applying injection fluid to all wells in the area, including all system monitoring points. Within the area of review, the map must show the following:

Class I

The number, or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, and other pertinent surface features, including residences and roads, and faults, if known or suspected. In addition, the map must identify those wells, springs, other surface water bodies, and drinking water wells located within one quarter mile of the facility property boundary. Only information of public record is required to be included on this map.

Class II

In addition to requirements for Class I, include pertinent information known to the applicant. This requirement does not apply to existing Class II wells;

Class III

In addition to requirements for Class I, include public water systems and pertinent information known to the applicant.

C. CORRECTIVE ACTION PLAN AND WELL DATA -- Submit a tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review, including those on the map required in B, which penetrate the proposed injection zone. Such data shall include the following:

Class I

A description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require. In

the case of new injection wells, include the corrective action proposed to be taken by the applicant under 40 CFR 144.55.

Class II

In addition to requirements for Class I, in the case of Class II wells operating over the fracture pressure of the injection formation, all known wells within the area of review which penetrate formation affected by the increase in pressure. This requirement does not apply to existing Class II wells.

Class III

In addition to requirements for Class I, the corrective action proposed under 40 CFR 144.55 for all Class III wells.

- D. MAPS AND CROSS SECTIONS OF USDWs** -- Submit maps and cross sections indicating the vertical limits of all underground indicating the vertical limits of all underground sources of drinking water within the area of review (both vertical and lateral limits for Class I), their position relative to the injection formation and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection. (Does not apply to Class II wells.)
- E. NAME AND DEPTH OF USDWs (CLASS II)** -- For Class II wells, submit geologic name, and depth to bottom of all underground sources of drinking water which may be affected by the injection.
- F. MAPS AND CROSS SECTION OF GEOLOGIC STRUCTURE OF AREA** -- Submit maps and cross sections detailing the geologic structure of the local area (including the lithology of injection and confining intervals) and generalized maps and cross sections illustrating the regional geologic setting. (Does not apply to Class II wells.)
- G. GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (CLASS II)** --For Class II wells, submit appropriate geological data on the injection zone and confining zones including lithologic description, geological name, thickness, depth and fracture pressure.
- H. OPERATING DATA** -- Submit the following proposed operating data for each well (including all those to be covered by area permits): (1) average and maximum daily rate and volume of the fluids to be injected; (2) average and maximum injection pressure; (3) nature of annulus fluid; (4) for Class I wells, source and analysis of the chemical, physical, radiological and biological characteristics, including density and corrosiveness, of injection fluids; (5) for Class II wells, source and analysis of the physical and chemical characteristics of the injection fluid; (6) for Class III wells, a qualitative analysis and ranges in concentrations of all constituents of injected fluids. If the information is proprietary, maximum concentrations only may be submitted, but all records must be retained.
- I. FORMATION TESTING PROGRAM** -- Describe the proposed formation testing program. For Class I wells the program must be designed to obtain data on fluid pressure, temperature, fracture pressure, other physical, chemical, and radiological characteristics of the injection matrix and physical and chemical characteristics of the formation fluids.

For Class II wells the testing program must be designed to obtain data on fluid pressure, estimated fracture pressure, physical and chemical characteristics of the injection zone. (Does not apply to existing Class II wells or projects.)

For Class III wells the program must be designed to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if the formation is naturally water bearing. Only fracture pressure is required if the formation is not water bearing. (Does not apply to existing Class III wells or projects.)

- J. STIMULATION PROGRAM** - Outline any proposed stimulation program.
- K. INJECTION PROCEDURES** -- Describe the proposed injection procedures including pump, surge, tank, Etc.
- L. CONSTRUCTION PROCEDURES** -- Discuss the construction procedures (according to §146.12 for Class I, §146.22 for Class II, and §146.32 for Class III) to be utilized. This should include details of the casing and cementing program, logging procedures, deviation checks, and the drilling, testing and coring programs, and proposed annulus fluid. (Request and submission of justifying data must be made to use an alternative to a packer for Class I.)
- M. CONSTRUCTION DETAILS** -- Submit schematic or other appropriate drawings of the surface and subsurface construction details of the well.
- N. CHANGES IN INJECTED FLUID** -- Discuss expected changes in pressure, native fluid displacement, and direction of movement of injected fluid. (Class III wells only.)
- O. PLANS FOR WELL FAILURES** -- Outline contingency plans (proposed plans, if any, for Class II) to cope with all shut-ins or well failures, so as to prevent migration of fluids into any USDW.
- P. MONITORING PROGRAM** -- Discuss the planned monitoring program. This should be thorough, including maps showing the number and location of monitoring wells as appropriate and a discussion of monitoring devices, sampling frequency, and parameters measured. If a manifold monitoring program is utilized, pursuant to §146.23(b)(5), describe the program and compare it to individual well monitoring.
- Q. PLUGGING AND ABANDONMENT PLAN** -- Submit a plan for plugging and abandonment of the well including: (1) describe the type, number, and placement (including the elevation of the top and bottom) of plugs to be used; (2) describe the type, grade, and quantity of cement to be used; and (3) describe the method to be used to place plugs, including the method used to place the well in a state of static equilibrium prior to placement of the plugs. Also for a Class III well that underlies or is in an exempted aquifer, demonstrate adequate protection of USDWs. Submit this information on EPA Form 7520-14, Plugging and Abandonment Plan.
- R. NECESSARY RESOURCES** -- Submit evidence such as a surety bond or financial statement to verify that the resources necessary to close, plug or abandon the well are available.
- S. AQUIFER EXEMPTIONS** -- If an aquifer exemption is requested, submit data necessary to demonstrate that the aquifer meets the following criteria: (1) does not serve

as a source of drinking water; (2) cannot now and will not in the future serve as a source of drinking water; and (3) the TDS content of the ground water is more than 3,000 and less than 10,000 mg/l and is not reasonably expected to supply a public water system. Data to demonstrate that the aquifer is expected to be mineral or hydrocarbon producing, such as general description of the mining zone, analysis of the amenability of the mining zone to the proposed method, and time table for proposed development must also be included. For additional information on aquifer exemption, see 40 CFR 144.7 and 146.01.

T. EXISTING EPA PERMITS -- List program and permit number of any existing EPA permits, for example, NPDES, PSD, RCRA, etc.

U. DESCRIPTION OF BUSINESS -- Give a brief description of the nature of the business.